Appendix – Amended Claims

1. (currently amended) A process comprising the steps of:

(a) selectively exposing a polymer substrate in an oxidizing atmosphere to actinic light, wherein:

> **(*i*)** the polymer substrate comprises a polymeric or copolymeric composition containing one or more functionalities that will photooxidize to carboxyl groups that remain bound to the polymer surface, when the polymer surface is exposed to actinic light in an oxidizing atmosphere;
>
> **(*ii*)** the light selectively exposes portions of the polymer surface in accordance with a pre-determined pattern, while not exposing the remaining portions of the polymer surface to substantial light;
>
> **(*iii*)** the fluence of light in the exposed portions of the polymer surface suffices to induce photooxidation of polymer on or near the polymer surface, sufficient to generate substantial quantities of carboxyl groups that remain bound to the polymer surface, but insufficient to cause substantial photoablation of polymer surface in the exposed portions;
>
> **(*iv*)** the fluence of light in the unexposed portions of the polymer surface is zero, or is insufficient to induce the generation of substantial quantities of carboxyl groups that remain bound to the polymer surface;
>
> **(*v*)** the polymer surface is essentially free of any photoresist that is responsive to the actinic light at the fluence applied to the exposed portions of the polymer surface; and

(b) reacting the resulting, bound carboxyl groups with one or more reactants, to impart chemical functionality to the exposed portions of the polymer surface

different from carboxyl functionality, while not imparting substantial amounts of the same type of chemical functionality to the unexposed portions of the polymer surface; wherein:

(*vi*) the one or more reactants are selected from the group consisting of amines, imides, azides, azo compounds, cyanates, thiols, anhydrides, thionyl halides, metal oxides, ceramics, piezoelectric materials, semiconductors, oligonucleotides, antibodies, antigen-binding portions of antibodies, antigens, enzymes, non-enzymatic peptides, non-enzymatic proteins, polymers, reduced metals, and oxidized metals;

(*vii*) the one or more reactants comprise a chemical group with which the bound carboxyl groups react; wherein the chemical group is selected from the group consisting of amines, imides, azides, azo compounds, cyanates, thiols, anhydrides, thionyl halides, metal oxides, ~~ceramics, piezoelectric materials, semiconductors,~~ oligonucleotides, antibodies, antigen-binding portions of antibodies, antigens, enzymes, non-enzymatic peptides, non-enzymatic proteins, ~~polymers,~~ reduced metals, and oxidized metals; and

[[(*vii*)]] (*viii*) *provided that*, if the reactant is an amine, then said process additionally comprises the step of reacting the amine with carboxyl bound to the polymer to produce an amide group that is covalently linked to the polymer.

2. (original) A process as recited in Claim 1, wherein the actinic light comprises ultraviolet light, deep ultraviolet light, or near ultraviolet light.

3. (original) A process as recited in Claim 1, wherein the actinic light comprises visible light.

4. (previously presented) A process as recited in Claim 1; wherein the fluence of light on the exposed portions of the polymer surface suffices to generate at least about 10^{-12} moles per cm^2 of carboxyl groups that remain bound to the polymer surface; wherein the fluence of light on the exposed portions of the polymer surface is insufficient to cause photoablation of polymer deeper than about 250 nm; and wherein the fluence of light on the unexposed portions of the polymer surface is zero, or is sufficient to induce the generation of not more than about 5×10^{-13} moles per cm^2 of carboxyl groups that remain bound to the polymer surface.

5. (original) A process as recited in Claim 1, wherein the one or more reactants are selected from the group consisting of oligonucleotides, antibodies, antigen-binding portions of antibodies, antigens, enzymes, non-enzymatic peptides, and non-enzymatic proteins.

6. (original) A process as recited in Claim 1, wherein the one or more reactants comprise a reduced or oxidized metal; or wherein said process additionally comprises the step of reacting the chemical functionality with a reduced or oxidized metal to bind the metal to the functionality.

7. (original) A process as recited in Claim 6, wherein the reduced or oxidized metal is selected from the group consisting of copper, nickel, gold, silver, platinum, and palladium.

8. (original) A process as recited in Claim 1, wherein the chemical functionality comprises at least one nitrogen, oxygen, or sulfur atom having a lone pair of electrons; and wherein said process additionally comprises the step of coordinating at least one reduced or oxidized metal atom to the nitrogen, oxygen, or sulfur atom's lone pair of electrons.

9. (original) A process as recited in Claim 1, wherein the chemical functionality comprises at least one nitrogen, oxygen, or sulfur atom having a lone pair of electrons; and wherein said process additionally comprises the sequential steps of: **(a)** coordinating at least one oxidized metal atom to the nitrogen, oxygen, or sulfur atom's lone pair of electrons; and **(b)** reducing the coordinated metal atom *in situ*; whereby reduced metal is selectively bound to the exposed portions of the polymer surface.

10. (original) A process as recited in Claim 1, wherein the one or more reactants are selected from the group consisting of metal oxides, ceramics, piezoelectric materials, and semiconductors.

11. (previously presented) A process as recited in Claim 1, wherein the one or more reactants are selected from the group consisting of amines, imides, azides, azo compounds, cyanates, thiols, anhydrides, and thionyl halides.

12. (original) A process as recited in Claim 1, wherein: **(a)** the one or more reactants comprise a second polymer; or **(b)** the one or more reactants comprise a polymer initiator or a monomer, and said process additionally comprises the step of forming a second polymer bound to the first polymer *in situ* by reaction of monomer with the bound initiator or bound monomer.

13. (previously presented) A process as recited in Claim 1, additionally comprising the step of binding one or more whole, respiring cells to the chemical functionality on the polymer surface.

14. (previously presented) A process as recited in Claim 1, wherein the polymer substrate is selected from the group consisting of acrylate polymers, aromatic polymers, polyimides, polycarbonates, and polysulfones.

15. (previously presented) A process as recited in Claim 1, wherein the polymer substrate comprises a polysulfone.

16. (previously presented) A process as recited in Claim 1, wherein the polymer substrate comprises poly (methyl methacrylate).

17 - 48 (canceled)